

Youth and revolution in Tunisia



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Tunisian Women: A Success Story



**Laboratory of Medical Parasitology, Biotechnology
and Biomolecules Immuno-Biotechnology Groupe
Institut Pasteur de Tunis**



18 diagnostic laboratories



in 2017

55 ongoing research projects

9 research laboratories

146 peer reviewed publications

Nearly
500 employees,
including
more than
115 scientists

More than
200 students

The only
vaccine and
serum production
facility in Tunisia
center

1 anti-rabies
treatment
center

Scientific vulgarization

Youth for science association
Summer Camp
Teaching high school students about DNA



Appointment in lab

Short videos : the activities, innovation and research shared on open science .





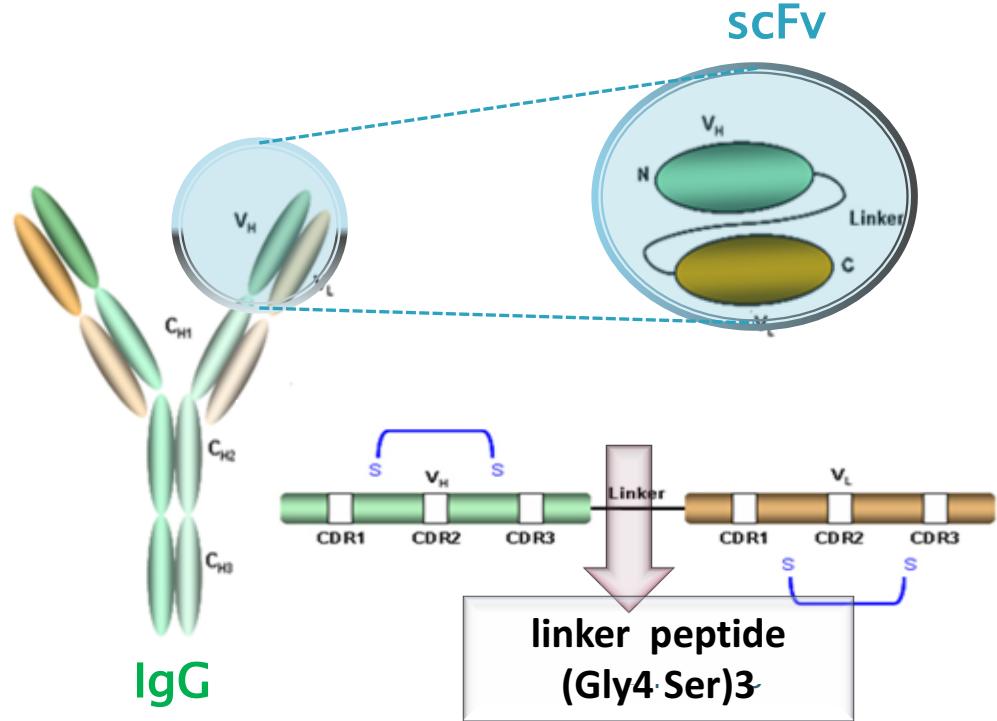
Toxoplasma gondii

Is an obligate
intracellular parasite
that infects 30% of
the world's population

What?

Economic and health problems: Humans and animals

scFv



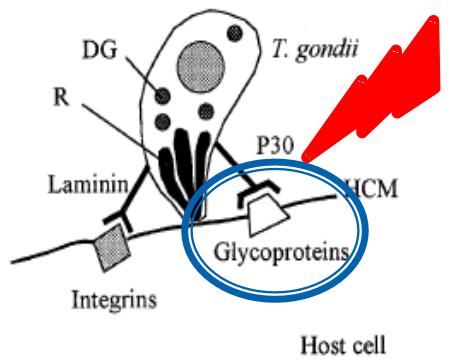
Advantages Of scFv

- ✓ Small size (29 kDa)
- ✓ Little immunogenic
- ✓ Stable and non-glycosylated
- ✓ Production in bacteria systems
- ✓ Intrinsic properties can be modified by mutagenesis
- ✓ Basic modules for the formation of multivalent fragments and / or fusion proteins

scFv :Therapeutic use

scFv :Diagnostic use

Inhibition of invasion process of *T. gondii*



scFv anti-SAG1

A
Attachement

B
Penetration

C
Internalisation

The major surface antigen of *T. gondii*: SAG1

→ SAG1 is the ligand which initiates the invasion of tachyzoites into the host cell



Engineering of Variable Fragment Antibodies anti-SAG1 for Therapeutic and Immunodiagnostic Use of *Toxoplasma gondii* the Parasite

Currently researching



1

- Cloning of the scFvSG15 gene into pET22b+ vector
- Sequencing

2

- Prokaryotic Expression and purification analyses
- Cloning scFvSG15-AP fusion protein into pLIP6 vector : genetic fusion with an engineered bacterial alkaline phosphatase;

3

- Bifunctionality of the recombinant fusion protein: ELISA test, Immuno-capture ELISA test, Dot blot assay, immuno-imprint
- Fluorescence microscopy:
- ELISA : spectrofluorometer (4-MUP, 4 methylumbelliferyl phosphate)



Perspectives

in vitro activity

- the potential of the developed scFvSG15-PA conjugate for the detection of *SAG1* in brain impressions, and cell infected by *T gondii*

in vivo activity

- the potential of the developed scFvSG15-PA conjugate for the detection of tachyzoites in different sources, such as milk, contaminated water, and body fluids.

Diagnostic use

- the use of this recombinant colorimetric fusion protein (scFv-AP) in different assays for a one-step detection of *Toxoplasma gondii*.

Therapeutic use

- the potential of the developed scFvSG15 monmeric and or dimeric for blocking the procesus of invasion of *T gondii*

- ❖ Application of Biacore technology : recombinant protein/ *Sag1* interaction, binding affinities...
- ❖ Application of Flow Cytometry for Assessing Soluble scFvSG15 Activities and Detecting Antigens in Solution



Long Term scientific goals:

- Development of a rapid Diagnostic tool to detect the T.gondii parasite infections in different samples.
- Use of this study (Engineering of Variable Fragment of Antibodies) as a model for others parasites and infectious diseases.
- Get a postdoctoral position
- Writ a project and get funding : Protein Engineering , Design, expression and characterization of in vitro immunodiagnostic reagents for infectious diseases



Difficulties in doing research in Tunisia

- Economic Problems: The Ministry's budget for scientific research in 2017 has been set at **300 MTD (107 M€)** , of which **90.7 MTD (33 M€)** is allocated directly to research Structures.
- The time taken to receive a product order
- The lack of international collaborations.
- The lack of equipment and materials

Thank you for your attention

